

1. Introduction :

1.1 Project Overview: In the modern retail landscape, where competition is intense and consumer attention is fragmented, product placement strategies can significantly influence customer purchasing behavior. Businesses often invest in promotional activities, optimized store layouts, and targeted marketing, but lack the tools to evaluate their real impact. This project aims to bridge that gap using data visualization.

The project titled “Strategic Product Placement Analysis Using Tableau” focuses on uncovering insights from structured retail data that includes variables like product positions (e.g., end caps, aisles), sales volume, price comparisons, promotional status, customer demographics, and foot traffic levels.

By utilizing Tableau, we transform raw spreadsheet data into interactive dashboards that help stakeholders answer key questions:

- Which product placements drive the highest sales?
- How do promotions and traffic zones affect buying behavior?
- What role do demographics play in conversion?

The project leverages visual storytelling and filters to help non-technical users — such as retail managers and marketers — explore patterns in a self-service, visually intuitive format. The solution provides a 360-degree view of product performance across variables that were previously hard to analyze together.

1.2 Purpose : The purpose of this project is to enable data-driven decision-making in retail environments by visualizing and analyzing how various factors such as product placement, promotions, customer demographics, foot traffic, and competitor pricing impact overall sales volume.

Retail companies often struggle to interpret raw data stored in spreadsheets, which limits their ability to respond quickly to changing customer behavior or optimize their store layouts. This project addresses that gap by developing an interactive Tableau dashboard that transforms this raw data into meaningful and actionable insights.

Through this dashboard, stakeholders can:

- Visually compare product performance across different store areas (e.g., aisle vs. endcap).
 - Analyze the effectiveness of promotional strategies across demographic groups.
 - Understand how traffic zones influence buying decisions, and adjust layouts accordingly.
 - Compare pricing against competitors to better position products for conversion. The project serves not only as a tool for analysis but also as a strategic aid for marketing, merchandising, and operations teams. It simplifies the decision-making process by:
 - Providing custom filters (like demographics and traffic level),
 - Enabling quick comparisons between different positioning strategies,
 - And delivering visual stories that present findings in a sequential, understandable way.
- Ultimately, the purpose of this solution is to empower retail organizations with a scalable, visual analytics platform that improves sales performance, enhances the shopping experience, and leads to smarter marketing and placement strategies.
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2. IDEATION PHASE :

2.1 Problem Statement : Retailers face a common yet critical challenge: they lack visibility into how product positioning affects consumer behavior and sales performance. While companies invest in promotions, layout design, and pricing strategies, they often make these decisions based on intuition or historical assumptions rather than real, current data insights.

The absence of interactive visual tools makes it difficult for retail teams to explore how variables like product category, traffic levels, promotions, and customer demographics intersect to influence sales. As a result, businesses may place high-performing items in low-traffic zones, run ineffective promotions, or fail to engage key demographic segments — all of which lead to missed sales opportunities and inefficiencies in floor planning.

Traditional reporting tools like spreadsheets:

- Do not provide real-time interactivity
- Cannot offer multi-variable analysis (e.g., how promotions affect seniors in high-traffic areas)

- Require manual exploration and time-consuming analysis

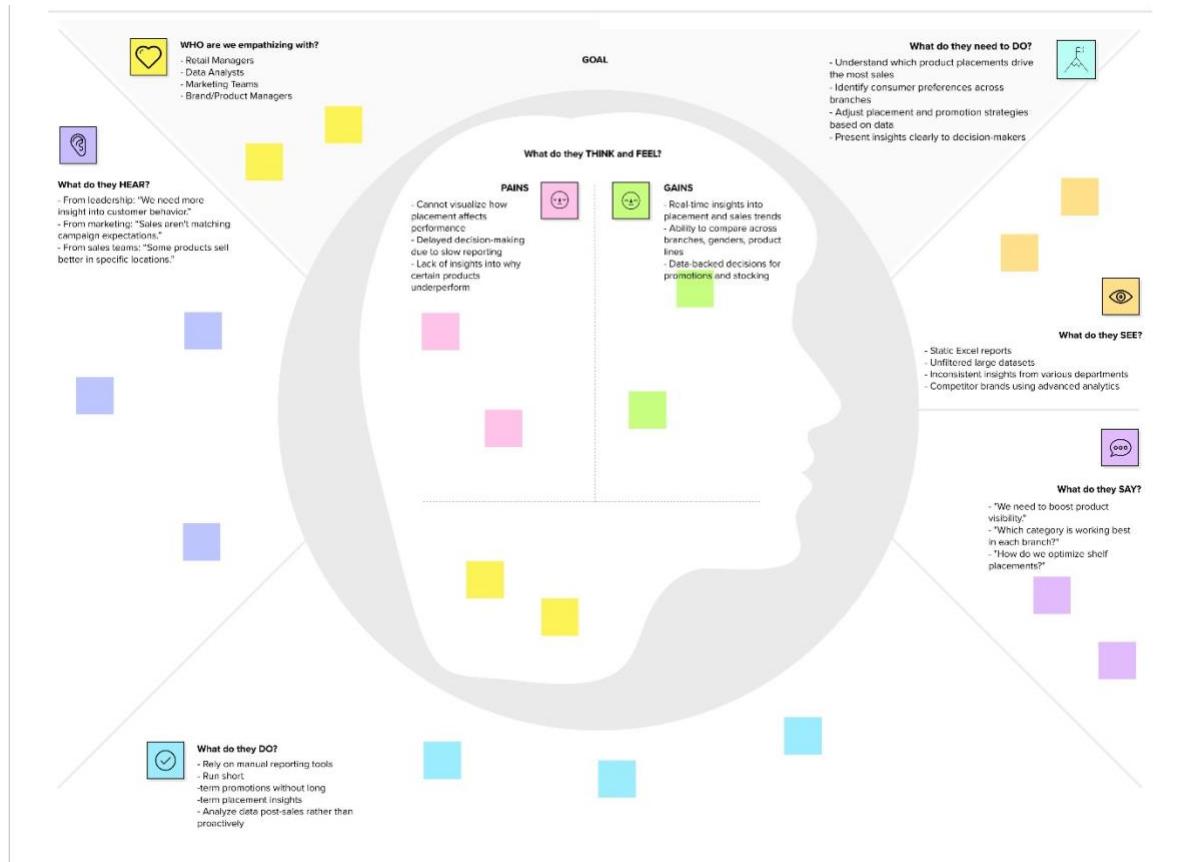
This problem is further amplified in large retail chains with thousands of products and multiple store locations. Without an integrated visualization system, it's nearly impossible to optimize placement strategies consistently across all sites.

Hence, there is a strong need for a solution that:

- Visualizes the impact of strategic product positioning
- Allows for interactive exploration of sales data
- Supports quick, data-backed decisions by retail stakeholders

This project aims to solve that problem by developing an interactive Tableau dashboard that connects business teams directly to their data in a visual, actionable format.

2.2 Empathy Map Canvas :



2.3 Brainstorming :

2.3.1. Team Collaboration and Approach : To begin our project, our team conducted a collaborative brainstorming session to explore various ways to approach the

problem of unclear product placement effectiveness in retail. We gathered insights by analyzing the dataset Product Positioning.csv and listing key attributes such as:

- Product Position (e.g., aisle, end-cap)
- Foot Traffic (low, medium, high)
- Promotion (yes/no)
- Consumer Demographics (e.g., young adults, seniors)
- Sales Volume
- Product Category

We discussed how these dimensions could influence customer buying behavior and what visuals would most effectively communicate the results to stakeholders like retail managers, marketers, and business analysts.

2.3.2. Ideas Generated and Grouped by Category:

Idea	Category
Compare sales volume by product position (aisle vs end-cap) using bar chart	Placement Strategy
Show conversion or drop across traffic levels using funnel chart	Traffic Analysis
Use donut chart to visualize promotional vs. nonpromotional product performance	Promotion Analysis
Create a highlight table for demographics vs. product category sales	Demographic Mapping
Visualize price gap vs. sales performance using calculated field	Pricing Strategy
Add filters for foot traffic, demographics, seasonal flag	Interactivity
Create a word cloud of top-selling product categories	User Engagement
Use waterfall chart to show contribution of each category to total sales	Financial Insight
Add a Tableau Story to guide business users through analysis in stages	Storytelling/Presentation

2.3.3. Prioritization:

Priority	Idea	Reason
High	Bar Chart for Product Position vs Sales	Core to solving the project's main problem

Priority	Impact	Donut Chart for Promotion	Simple and clear to stakeholders
	Idea		Reason
High	Highlight Table for Demographics		Helps target customer segments more precisely
High	Filters for Category, Traffic, and Promotion		Essential for interactivity
Medium	Funnel and Waterfall Charts		Adds depth to financial and behavioral insight
Low	Word Cloud and Storyboard		Adds polish and storytelling but not critical to logic

3. REQUIREMENT ANALYSIS :

3.1 Customer Journey map : The Customer Journey Map helps visualize the enduser's experience from problem identification to solution adoption. For this project, our primary users are retail managers, marketing analysts, and store planners who want to improve sales using data-driven product placement.

Stage	User Action	User	Solution / Pain Points	
		Experience	/ Barriers	Feature in Dashboard
Awareness	Notices inconsistent sales patterns and underperforming promotions	Frustrated by lack of visibility into what's working	Depends on static reports or gut by position, feeling promo, traffic	Dashboard reveals sales
Consideration	Explores sales data in Excel and tries to isolate patterns manually insights	Overwhelmed by data complexity and too many variables	Excel not suitable for multi-dimensional analysis	Tableau visualizations simplify and organize analysis

Adoption Stage	User Action	Feels in control, can explore data freely	Unsure how to analyze traffic, interactions, demographics etc.	Solution / Feature in Dashboard
		User Experience	Pain Points / Barriers	
Insight	Discovering that promotions in high-traffic zones improve sales among youth	Gains insight that can be turned into strategy	Hard to validate hypothesis without historical view	Visual trends and highlight tables clarify patterns
Action	Repositions products and targets promos based on dashboard findings	Confident in decisionmaking	Needs support to present results to leadership	Dashboard storytelling feature and export capability
Feedback	Shares dashboard with colleagues and adjusts based on results	Feels empowered by team alignment	May want deeper segmentation or automation	Dashboard is scalable and can be enhanced later

3.2 Solution Requirement:

Functional Requirements: These describe **what the system must do** — the features and capabilities that are essential to building your Tableau dashboard for product placement analysis.

FR No.	Functional Requirement (Epic)	Sub-Requirement (Story / Sub-Task)
FR-1	Upload Data	User uploads the Product Positioning.csv dataset into Tableau

		Convert data types, clean missing values, rename fields
FR-2	Data Preprocessing	
FR No.	Functional Requirement (Epic)	Sub-Requirement (Story / Sub-Task)
FR-3	Visualize Product Performance	Create bar chart showing sales by product position
FR-4	Analyze Promotion Effectiveness	Build donut chart comparing sales for promotion = Yes vs No
FR-5	Evaluate Traffic Impact	Funnel or area chart visualizing sales by foot traffic levels
FR-6	Demographic Sales Comparison	Highlight table showing sales volume by consumer demographics
FR-7	Visual Storytelling	Build a Tableau story combining visuals to explain key insights
FR-8	Interactive Filters	Add filters for Promotion, Traffic Level, Demographics, and Category
FR-9	Export Dashboard	Allow users to export visuals to PDF or PNG for reporting purposes

Non-Functional Requirements: These define **how the system should perform**, covering quality standards like performance, usability, and scalability.

NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	The dashboard should be intuitive and easy for non-technical users to navigate
NFR-2	Reliability	The visuals must consistently reflect correct results when filters are applied

NFR No.	Non-Functional Requirement	Description
NFR-3	Performance	Dashboard should load and respond within 5 seconds for 1000+ rows
NFR-4	Availability	The dashboard should be accessible via Tableau Public or PDF anytime
NFR-5	Scalability	Must support addition of new product categories or more rows without redesign
NFR-6	Security	Dataset is handled locally or via secure sharing; no personal data is exposed

3.3 Data Flow Diagram: A Data Flow Diagram (DFD) shows how data moves through your system — from input to final output — across different components. This project processes a CSV dataset through Tableau to produce interactive dashboards for business decision-making.

Level 1 DFD – Detailed Process Flow:

	Process Component	Description
1	Data Input	User uploads Product Positioning.csv to Tableau
2	Data Cleaning & Formatting	Missing value check, column type conversion, column renaming
3	Calculated Fields	Fields like Price Gap, Sales Category, % Difference
4	Visualization Engine	Tableau sheets and dashboards created using multiple chart types
	Process Component	Description

5	Filters	Applied on Promotion, Traffic, Demographics, Product Category
6	Dashboard Assembly	All sheets combined into one interactive dashboard
7	Storytelling Mode	Tableau story created to walk stakeholders through key insights
8	Output	Users view or export dashboard results (PDF, image, or shareable link)

3.4 Technology Stack: This section outlines the tools, technologies, and components used to build and deploy the solution. It includes both the architecture layers and the technology choices for your project.

A. Technical Architecture (3-Tier Design)

Layer	Component Description
Presentation Layer	The final Tableau Dashboard UI, visible to users. Includes interactive filters and visuals
Application Layer	Tableau Engine responsible for creating calculations, visual logic, and rendering visuals
Data Layer	Raw dataset: Product Positioning.csv stored locally or on Google Drive

B. Components & Technologies Used

S. No	Component	Description	Technology Used
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1	Tableau Dashboard with visual and filter components	Tableau Public / User Interface Desktop
2	Data cleaning, type conversion, and calculated fields	Tableau, Optional: Data Processing Python/Pandas
3	Dataset stored and imported into Tableau	Local File System / File Storage Google Drive
4	Visualization	Tableau Visualization Chart rendering and interactivity
4	Engine	Engine
5	Story	Tableau Story feature for
	Presentation	sequential insights
6	Export & Sharing	Export reports in PDF/Image formats; public dashboard access
		Tableau Public / PDF Export

C. Application Characteristics

Feature	Description	Technology Used
Open Source Frameworks	Tableau Public is freely accessible, optional use of Python (Pandas)	Tableau Public, Pandas
Security	Controlled data sharing via Tableau Public permissions and Google Drive	Tableau Share Settings

Feature	Description	Technology Used
Scalability	Can support more data rows, product lines, or new categories easily	Tableau Extract Engine
Availability	Hosted via Tableau Public or downloadable as a file for 24/7 access	Tableau Public
Performance	Fast loading for up to 1000+ rows with live filters and dashboard response	Tableau (Live / Extract)

4. PROJECT DESIGN:

4.1 Problem Solution Fit:

The Problem

Retailers often struggle with making data-driven decisions about product placement, promotions, and pricing strategies. While they collect vast amounts of sales data, most of it remains underutilized due to:

- Lack of interactive tools for visual exploration
- Difficulty in comparing multiple variables like **foot traffic, promotions, and demographics**
- Dependence on static reports and gut-feeling decision-making

As a result, businesses may miss key opportunities to optimize store layouts and promotional campaigns, leading to reduced conversion rates and inefficient use of retail space.

The Solution

This project proposes a **fully interactive Tableau dashboard** that transforms flat, static sales data into **dynamic visuals**. The dashboard allows users to:

- View and compare **sales volume by product placement**
- Analyze the **impact of promotions** across different traffic zones and demographics
- Explore the **gap between own pricing and competitor pricing**

- Identify which product categories and customer segments perform best under specific store conditions

By integrating **filters**, **calculated fields**, and **multiple chart types**, this solution allows retail managers and marketers to **see what works and why**, helping them act faster and smarter.

Why This Solution Fits the Problem with

Challenge

How the Solution Solves It

Static, unfilterable
spreadsheets

Tableau dashboard allows dynamic filtering and exploration

No correlation between
multiple variables

Users can interactively combine factors like traffic
+ promo + demographics

Manual analysis is timeconsuming

Visuals offer instant insights, reducing
dependency on Excel

Poor placement decisions

Dashboard shows which placements drive the
most sales

Difficulty sharing insights
teams

Tableau stories present clear, step-by-step visual
narratives

4.2 Proposed Solution : To address the challenges faced by retailers in optimizing product placement and understanding customer behavior, we propose a Tableau-based interactive dashboard solution that allows for deep exploration of sales data in relation to various influencing factors.

The proposed solution turns the flat, tabular data in Product Positioning.csv into a dynamic, visual analytics environment where users can interact with the data, apply filters, and gain real-time insights into how product placement, pricing, promotions, traffic levels, and demographics affect sales volume.

Key Features of the Proposed Solution

Feature	Description
Bar Charts	Compare sales volumes across product categories or placement types
Donut Charts	Visualize promotional vs. non-promotional sales impact
Funnel Charts	Track sales performance across traffic zones (low → high)
Highlight Tables	Cross-compare customer demographics and sales performance
Waterfall	Show contribution of product categories to total revenue
Charts	Identify top-selling product types visually
Word Clouds	Slice the data by promotion, foot traffic, product category, and demographics
Interactive Filters	Add fields like price gap, promo impact, and sales classification
Calculated Fields	

Dashboard	Present key findings as a narrative, useful for management reporting
Story	
Export Options	Enable export of visuals to PDF or images for sharing or presentation

How the Solution Will Be Implemented

1. **Data Upload & Preparation**
 - Import the Product Positioning.csv file into Tableau
 - Clean and format the data
 - Create calculated fields like Price Gap and Promotion Impact
2. **Dashboard Design**
 - Develop individual chart types on separate sheets
 - Apply filters globally across all visualizations
 - Use color coding and labels to enhance readability
3. **Storytelling and Output**
 - Use Tableau Story feature to sequence insights for stakeholders
 - Export dashboards or visual summaries for presentations

4.3 Solution Architecture:

. A. Technology Stack:

Component	Technology Used
Data Storage	Local CSV File / Google Drive
Data Processing	Tableau Desktop or Public
Visualization Engine	Tableau Visualization Engine
Storytelling & Output	Tableau Story Feature

Sharing & Export

Tableau Public, PDF Export

Optional Enhancements

Python + Pandas (for advanced preprocessing)

B. Key Functional Features Enabled by Architecture:

- **Calculated Fields** like:
 - Price Gap = Price - Competitor Price
 - Promotion Impact = IF Promotion = "Yes" THEN Sales Volume ELSE 0 ◦ % Price Difference to track underpricing or overpricing impact
- **Dashboard Filters** for:
 - Demographics
 - Promotion
 - Product Category
 - Foot Traffic
- **Charts & Visuals:**
 - Funnel Chart for traffic drop-off ◦ Waterfall Chart for category-wise sales contribution ◦ Donut Chart for promo vs. non-promo analysis ◦ Highlight Table for segment-wise comparison

5. PROJECT PLANNING & SCHEDULING:

5.1 Project Planning: Project planning is essential to ensure the systematic development of the Tableau dashboard. Our approach followed the Agile methodology with three focused sprints, each creation and final presentation. targeting core functional elements of the solution — from data handling to dashboard

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Setup & Cleaning	USN-1	As an analyst, I want to upload and clean the dataset so it is ready for visualization in Tableau	2	High	You + Teammates
Sprint-1	Basic Visualization Design	USN-2	As a user, I want to build bar and donut charts to compare categories and promotion impact	3	High	You
Sprint-1	Dashboard Filtering	USN-3	As a user, I want to add filters (Promotion, Demographics, Traffic) to interact with dashboards	2	Medium	You
Sprint-2	Advanced Visualizations	USN-4	As a user, I want to visualize data with funnel and highlight tables to show customer and sales behavior	4	High	You + Peer
Sprint-2	Waterfall and Area Chart Design	USN-5	As a user, I want to see sales contribution and trend across product categories and traffic zones	3	Medium	You
Sprint-3	Story Building	USN-6	As a presenter, I want to create a Tableau Story to communicate findings step-by-step	2	Medium	You
Sprint-3	Export & Presentation	USN-7	As a user, I want to export visuals and present the complete dashboard for stakeholders	2	High	You

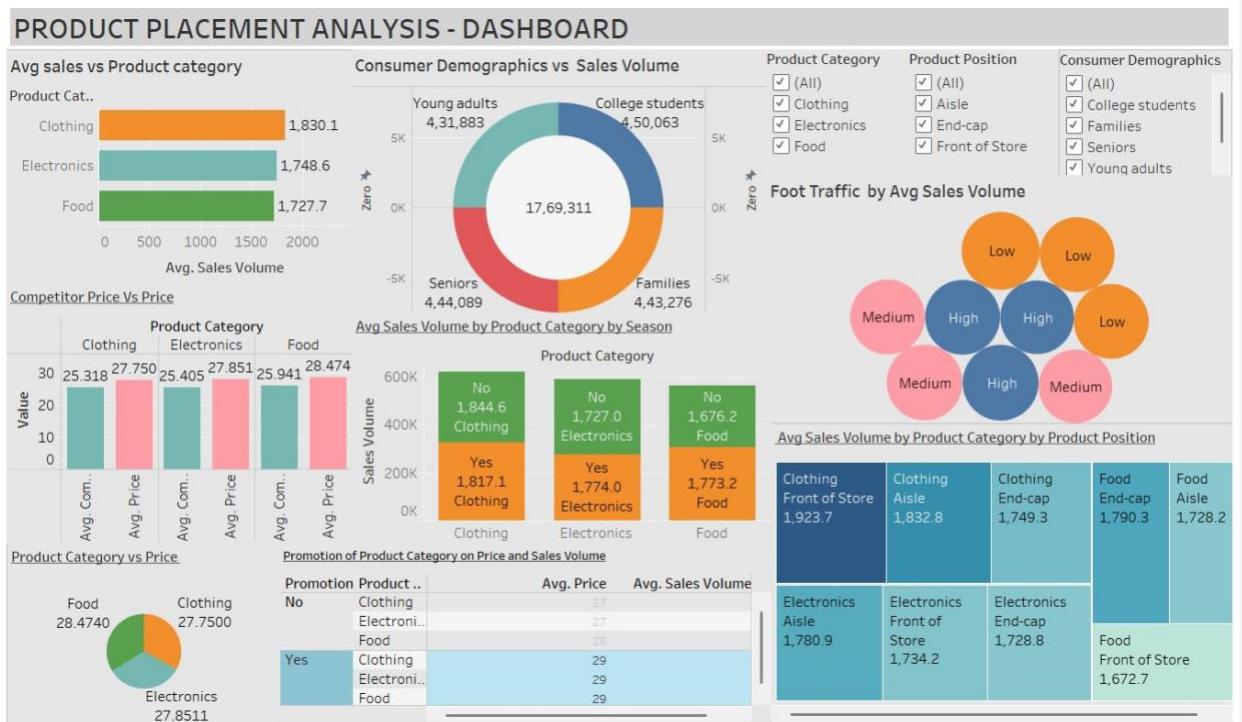
6. PERFORMANCE TESTING :

Model Performance Testing:

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	<p>The dataset used contains 1000 entries related to product placement, pricing, traffic, demographics, promotions, and sales volume. Key fields include:</p> <ul style="list-style-type: none">• Product_Position• Foot_Traffic• Promotion• Consumer_Demographics• Sales Volume
2.	Data Preprocessing	<ul style="list-style-type: none">- Verified and converted column types- Removed missing/null entries (none in this dataset)- Renamed columns for clarity in Tableau
3.	Utilization of Filters	<p>Global filters used in dashboard:</p> <ul style="list-style-type: none">• Product Category• Promotion (Yes/No)• Foot Traffic (Low/Medium/High)• Seasonal (Yes/No) <p>All filters are applied across all visualizations to enable comparative analysis</p>
4.	Calculation fields Used	<ul style="list-style-type: none">- Price Difference = [Price] - [Competitor's Price]- % Gap = (([Price] - [Competitor's Price])) / [Competitor's Price]
5.	Dashboard design	<p>Included:</p> <ul style="list-style-type: none">• Bar Chart – Avg Sales by Product Category• Donut Chart – Promotion-wise Sales• Funnel Chart – Sales by Product Position• Area Chart – Traffic vs Sales• Highlight Table – Demographics vs Sales Volume• Waterfall Chart – Contribution of each Product Category
6	Story Design	<p>Story includes:</p> <ul style="list-style-type: none">• Overview• Placement Strategy Impact• Promotion Effectiveness• Sales Optimization Insights

7. RESULTS :

7.1 Output Screenshots:



8. ADVANTAGES & DISADVANTAGES:

Advantages

Advantage

1. Easy to Understand & Use

2. Actionable Visual Insights

3. Data-Driven Decision-Making

4. Customization & Flexibility

Description

Tableau dashboards offer intuitive drag-and-drop interactivity, making it user-friendly even for non-technical stakeholders.

Real-time filters and visuals allow retail decision-makers to analyze sales trends across product positions, promotions, and customer segments quickly.

Replaces guesswork and assumptions with clear, evidence-based insights drawn from actual store data.

Users can filter data by demographics, traffic, promotion, and more, tailoring insights to specific goals.

Advantage	Description
5. Visual Storytelling	The Tableau Story feature allows presentation of insights in a logical, narrative format ideal for stakeholder presentations.
6. Low Cost & Lightweight Setup	Uses publicly available tools (Tableau Public and CSV files) without requiring complex infrastructure or expensive licenses.
7. Scalable Design	The solution can be scaled easily to include new branches, time periods, or additional product lines with minimal architectural changes.
Disadvantages	Description
1. Static Data Source	Since the dataset is CSV-based, it lacks real-time data updates. Manual uploads are required for each update cycle.
2. No Predictive Capabilities	The current solution is descriptive, not predictive. It identifies patterns but doesn't forecast future trends.
3. Limited Automation	Without integration to live data sources (e.g., APIs, databases), it cannot support automated, continuous data refresh.
4. Requires Tableau Familiarity for Editing	While the dashboard is easy to use, editing charts or building new visuals requires knowledge of Tableau.
5. No Backend Storage for Historical Dashboards	Tableau Public does not support complex versioning or change-tracking unless hosted in Tableau Cloud/Server.

9. CONCLUSION:

This project, Strategic Product Placement Analysis Using Tableau, successfully demonstrates how retail data — when visualized effectively — can uncover meaningful insights that directly impact sales performance and customer engagement.

By transforming a static dataset (Product Positioning.csv) into a fully interactive and filterable Tableau dashboard, the project empowers retail stakeholders to:

- Identify which product placements result in the highest sales.

- Understand the impact of promotional strategies across traffic zones and customer demographics.
- Compare pricing with competitors and explore how these differences affect conversion.
- Highlight trends that were previously hidden in spreadsheets or traditional static reports.

The dashboard offers an easy-to-use, visually intuitive interface that supports real-time filtering, multiple chart types (e.g., funnel, donut, bar, waterfall), and a narrative story to present findings effectively. It has proven to be an essential decision-support tool for:

- Retail managers planning shelf layouts

- Marketing teams optimizing promotions
- Analysts identifying patterns in customer behavior

Through structured project planning, sprint-based execution, and iterative design, the solution met all key objectives:

- Enhanced data visibility
- Improved decision-making speed
- Reduced reliance on manual reports

While there are limitations — such as the static nature of the data and absence of predictive analytics — the foundation laid in this project is robust, extensible, and provides a strong base for advanced analytics in the future.

In conclusion, the project validates that visual data storytelling using Tableau is a powerful enabler for smarter, customer-focused retail strategies.

10. FUTURE SCOPE:

1. Real-Time Data Integration

- Integrate live sales feeds from **Point-of-Sale (POS) systems**, Google Sheets, or retail databases.
 - Use Tableau's live data connection features or APIs to update dashboards automatically without manual intervention.
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2. Predictive Analytics and Machine Learning

- Incorporate **machine learning models** (using Python or R) to:
 - Predict which product placements are likely to generate higher conversions.
 - Forecast sales based on traffic and seasonal trends.
 - Integrate clustering to group similar customer behaviors for segmentationbased strategies.
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3. Cloud Deployment for Collaboration

- Host the dashboard on **Tableau Cloud or Tableau Server** to enable enterprise-wide collaboration and access.
 - Allow different teams (marketing, sales, inventory) to view, interact, and draw conclusions from the same source of truth.
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4. Deeper Segmentation and Personalization

- Enhance filters with **time of day, weekday vs. weekend, or specific customer personas**.
 - Add more granular demographic categories (e.g., income level, age group breakdown) for highly targeted marketing insights.
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5. Historical Data Versioning

- Implement **historical comparison features** (e.g., month-over-month, yearover-year sales).

- Add toggle options to compare past promotions and layout strategies for long-term analysis.
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6. Dashboard-as-a-Service Model

- Offer this Tableau dashboard as a **commercial SaaS product** for small-to-medium retailers.
- Provide custom versions with client-specific branding and integrated customer data.

11. APPENDIX:

- Dataset Link -
<https://docs.google.com/spreadsheets/d/1kWb3PGyJVvbIWDD5VX7nOiT2s5DqQggJ/edit?usp=sharing&ouid=112547506593735435883&rtpof=true&sd=true>
- GitHub – <https://github.com/AviAbhinav/Strategic-Product-Placement-Analysis>
- Project Demo Link -
<https://drive.google.com/file/d/1eFmVcDuSdcsFQBOfPxQc74qc3kO2AIG0/view?usp=sharing>